

What is claimed is:

1. A communication apparatus comprising:
generating means for generating a transmission
5 signal and gain control signal;
amplifying means for amplifying said transmission
signal with a gain according to said gain control signal;
error detecting means for calculating input/output
errors of this amplifying means; and
10 correcting means for correcting the transmission
signal and gain control signal generated by said
generating means so as to eliminate said errors.
2. The communication apparatus according to claim 1,
15 wherein the error detecting means calculates a phase
difference between the input signal and output signal
of the amplifying means and a difference between an
amplitude difference between the input signal and the
output signal of said amplifying means, and an expected
20 value as an input/output error of said amplifying means.
3. The communication apparatus according to claim 1,
further comprising radio frequency modulating means for
modulating the transmission signal generated by the
25 generating means to a radio frequency and outputting to
the amplifying means, wherein the error detecting means
calculates a phase difference between the input signal
of said radio frequency modulating means and the output

signal of said amplifying means and a difference between an amplitude difference between the input signal of said radio frequency modulating means and the output signal of said amplifying means, and an expected value as an input/output error of said amplifying means.

4. The communication apparatus according to claim 1, further comprising a quadrature modulating means with an analog element structure that quadrature-modulates the transmission signal generated by the generating means, wherein the error detecting means calculates a phase difference between the input signal of said quadrature modulating means and the output signal of said amplifying means and a difference between an amplitude difference between the input signal of said quadrature modulating means and the output signal of said amplifying means, and an expected value as an input/output error of said amplifying means.

5. The communication apparatus according to claim 1, further comprising a first frequency converting means for converting signals used to calculate an input/output error of the amplifying means to a same low-frequency, wherein the error detecting means calculates the input/output error of said amplifying means from the output signal of said first frequency converting means.

6. The communication apparatus according to claim 1,

further comprising a second frequency converting means for converting a signal to a low frequency and a first switching means for sequentially outputting signals used to calculate input/output errors of the amplifying means to said second frequency converting means, wherein the error detecting means calculates an input/output error of said amplifying means from the output signal of said second frequency converting means.

7. The communication apparatus according to claim 1, further comprising a first mixing means for mixing the output signal and input signal of the amplifying means, wherein the error detecting means detects an input/output error of said amplifying means from the output signal of said first mixing means.

8. The communication apparatus according to claim 1, further comprising:

radio frequency modulating means for modulating the transmission signal generated by the generating means to a radio frequency and outputting to the amplifying means;

second mixing means for mixing the input signal of said radio frequency modulating means and the output signal of said amplifying means; and

third frequency converting means for converting the frequency of the output signal of said second mixing means to 0, wherein the error detecting means detects

an input/output error of said amplifying means from the output signal of said third frequency converting means.

9. The communication apparatus according to claim 1,
5 further comprising an attenuating means for attenuating the output signal of the amplifying means according to a gain control signal, wherein the error detecting means calculates an input/output error of said amplifying means using the signal attenuated by said first
10 attenuating means.

10. The communication apparatus according to claim 1,
further comprising a plurality of amplifying means and antennas for emitting the output signals of this
15 amplifying means, wherein when the generating means generates transmission signals and gain control signals corresponding to said amplifying means, said plurality of antennas multiply said transmission signals and gain control signals by coefficients to form directivity.

20 11. The communication apparatus according to claim 10, further comprising switching means for sequentially outputting signals used to calculate input/output errors of the amplifying means to the error detecting means.

25 12. The communication apparatus according to claim 1, wherein the correcting means converts a corrected transmission signal and gain control signal to an analog

signal and the error detecting means converts the input signal to a digital signal.

13. The communication apparatus according to claim 1,
5 further comprising amplitude/phase characteristic storing means for storing the amplitude/phase characteristic of the transmission signal versus the gain of the amplifying means based on the output signal and gain control signal of the error detecting means in
10 a calibration table, wherein the correcting means corrects the transmission signal and gain control signal based on the content of said calibration table.

14. The communication apparatus according to claim 13,
15 further comprising forced changing means for forcibly changing a power value and amplification value of the transmission signal generated by the generating means so that the product of said power value by said amplification value becomes a predetermined value.

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~~15~~. A communication apparatus comprising:

a plurality of radio apparatuses that amplify a reception signal to a fixed amplitude by auto-gain control;

25 a calibration apparatus in a same configuration as that of these radio apparatuses;

error detecting means for calculating amplitude and phase errors between auto-gain control signals and

demodulated signals output from said radio apparatuses and an auto-gain control signal and demodulated signal output from said calibration apparatus; and

correcting means for correcting the amplitude and
 5 phase of said auto-gain control signals and demodulated signals output from said radio apparatuses so as to eliminate said errors.

~~16.~~ A communication apparatus comprising:

10 a plurality of radio apparatuses that amplify a reception signal to a fixed amplitude by auto-gain control and quadrature-modulate said amplified signal;

a calibration apparatus that amplifies said
 reception signal to a fixed amplitude by auto-gain
 15 control and mixes this amplified signal with a signal amplified by any one of said radio apparatuses;

error detecting means for calculating amplitude and phase errors between the signal amplified by each of said radio apparatuses and the signal amplified by
 20 said calibration apparatus based on said mixed signal and calculating amplitude and phase errors between the auto-gain control signal output from each of said radio apparatuses and the auto-gain control signal output from said calibration apparatus; and

25 correcting means for correcting the amplitude and phase of the auto-gain control signal and demodulated signal output from each of said radio apparatuses so as to eliminate said errors.

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17. The communication apparatus according to claim 15, further comprising amplitude/phase characteristic storing means for storing amplitude/phase

5 characteristics of the reception signal with respect to the gain of the amplifying means in a calibration table based on the output signal and auto-gain control signal of the error detecting means, wherein the correcting means corrects the demodulated signal and auto-gain
10 control signal based on the content of said calibration table.

18. The communication apparatus according to claim 17, further comprising forced changing means for forcibly
15 changing a power value and amplification value of the demodulated signal corrected by the correcting means so that the product of said power value by said amplification value becomes a predetermined value.

20 19. The communication apparatus according to claim 15, further comprising:

first despreding means for performing despreding processing on each auto-gain control signal and demodulated signal output from each of a plurality of
25 radio apparatuses;

second despreding means for performing despreding processing on the auto-gain control signal and demodulated signal output from the calibration

first symbol correlating means for finding a symbol correlation value of the output signal of said first despreading means; and

5 second symbol correlating means for finding a
symbol correlation value of the output signal of said
second despreading means, wherein said detecting means
calculates amplitude and phase errors between the output
signal of said first symbol correlating means and the
10 output signal of said second symbol correlating means.

20. The communication apparatus according to claim 15,
further comprising:

third despreading means for performing despreading
15 processing on the auto-gain control signal and
demodulated signal output from each of a plurality of
radio apparatuses for each user; and

fourth despreading means for performing
despreading processing on the auto-gain control signal
20 and demodulated signal output from the calibration
apparatus for each user, wherein the error detecting
means calculates amplitude and phase errors between the
output signal of said third despreading means and the
output signal of said fourth despreading means on each
25 radio apparatus for each user and selects the errors of
the user with the optimal condition for each radio
apparatus.

21. The communication apparatus according to claim 15, further comprising:

third despreading means for performing despreading processing on the auto-gain control signal and demodulated signal output from each of a plurality of radio apparatuses for each user; and

fourth despreading means for performing despreading processing on the auto-gain control signal and demodulated signal output from the calibration apparatus for each user, wherein the error detecting means calculates amplitude and phase errors between the output signal of said third despreading means and the output signal of said fourth despreading means on each radio apparatus for each user and combines errors of all users for each radio apparatus.

22. The communication apparatus according to claim 20, further comprising:

third symbol correlating means for finding a symbol correlation value of the output signal of the third despreading means; and

fourth symbol correlating means for finding a symbol correlation value of the output signal of the fourth despreading means, wherein the error detecting means calculates amplitude and phase errors between the output signal of said third symbol correlating means and the output signal of said fourth symbol correlating means.

23. A base station apparatus comprising a communication apparatus, said communication apparatus comprising:

generating means for generating a transmission
5 signal and gain control signal;

amplifying means for amplifying said transmission signal with a gain according to said gain control signal;

error detecting means for calculating input/output errors of this amplifying means; and

10 correcting means for correcting the transmission signal and gain control signal generated by said generating means so as to eliminate said errors.

24. A base station apparatus comprising a communication
15 apparatus, said communication apparatus comprising:

radio apparatuses that amplify a reception signal to a fixed amplitude by auto-gain control and quadrature-modulate said amplified signal;

a calibration apparatus in a same configuration as
20 that of these radio apparatuses;

error detecting means for calculating amplitude and phase errors between the auto-gain control signal and demodulated signal output from said radio apparatuses and the auto-gain control signal and
25 demodulated signal output from said calibration apparatus; and

correcting means for correcting the amplitude and phase of said auto-gain control signal and demodulated

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signal output from each of said radio apparatuses.

25. A communication method comprising the steps of:
generating a transmission signal and gain control

5 signal;

amplifying said transmission signal with a gain
according to said gain control signal;

calculating a difference between phase and
amplitude difference before and after amplification, and
10 an expected value as an error; and

correcting said transmission signal and gain
control signal generated so as to eliminate said errors.

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